BACTERIOLOGICAL NOTES.

By Dr. Oscar Katz.

1.—Note on the Bacillus of Leprosy.

Since its discovery by Hansen and Neisser, about ten years ago, the bacillus of leprosy has been made the subject of numerous researches, with a view to its artificial cultivation, and its behaviour when experimentally transmitted to man or animals.

With reference to the first point, the only positive and unobjectionable results appear to have been obtained by G. Bordoni-Uffreduzzi,* who cultivated the bacilli in question from the marrow of an individual who had died from leprosy. Any attempts made by him to cultivate the micro-organism from the skin, spleen, liver and lymphatics of the dead subject, failed.

Some cultivation-experiments, which I undertook with material from living lepers, yielded negative results. For that purpose, I visited on two occasions the Asylum associated with the Coast Hospital at Little Bay, near Sydney, where at the time several lepers were, with one exception (native of Java), all Chinamen.

The material for experiment was derived from typical non-ulcerating tubercles of the hand. In each case a suitable tubercle was selected, and after having caused the man to wash his hand thoroughly with soap and water, I applied for some minutes a

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* "Ueber die Cultur der Leprabacillen." Von Dr. G. Bordoni-Uffreduzzi *Zeitschrift für Hygiene, Dritter Band, Erstes Heft*, 1887, p. 178.

5 p.m. watery solution of corrosive sublimate, whereupon the spot was carefully rinsed with a sterile 0·6 p.c. watery solution of sodium-chloride. The tubercle was then cut open through its whole mass by means of a sterilised scalpel. The blood which appeared first was rejected, but subsequently samples were taken from the bottom of the wound by means of a platinum-loop, and at once transferred on or into the culture-material.

(i) June 6, 1887. The material was supplied by a Chinaman who suffered from characteristic tuberous leprosy. Samples of blood from a rather large nodule on the right hand were transferred to half-a-dozen test-tubes on to the inclined surface of coagulated human hydrothorax fluid, which had been obtained from the Little Bay Hospital some time previously. Besides, one tube containing such fluid not coagulated, was charged with some of the leprosy-blood.

I will mention at once that the subsequent microscopical examination of cover-glass preparations of this blood showed only a very limited number of leprosy-bacilli.

A corresponding experiment was made with a small tubercle on the left hand of the same leper. Samples of blood taken from it served for sowing an equal number of tubes as before. This blood, as was afterwards proved by the microscopical examination, contained an enormous quantity of leprosy-bacilli.

On my return to Sydney, but not until the following day, all the tubes were placed in a thermostat, where they remained, at a temperature of 36° C. to about 34° C., for about two months. During this time they were occasionally inspected, but the result of the experiment was negative, in so far as I was unable to trace any multiplication of the bacilli.

(ii) November 21, 1887. Two Chinamen were selected, one of them being the same as above, the other having been brought to the Asylum since my last visit there. In each case a typical

tubercle of the hand was picked out for yielding the necessary material of blood, with which the following tubes were charged: for each case, five containing peptone-glycerine-agar, solidified at an inclined surface. [The composition was—meat-broth as usual; agar-agar 1 p.c., peptone 1 p.c., glycerine 6 p.c. (in weight), sodium-chloride 0·6 p.c.; reaction slightly alkaline.]

On microscopic examination of each of the two descriptions of blood, leprosy-bacilli were seen to be present in moderate numbers.

The tubes (fourteen in all) were placed, in the evening of the same day, in a thermostat, in which they were kept for a month, at a temperature of about 37°C. At the end of this period the tubes were still sterile; the pocket-lens could not discover any sign of growth having taken place in them.

As to the question whether leprosy is inoculable into animals or not, the opinions still differ. The possibility of its contagiousness in regard to man is now proved beyond doubt. It will be remembered that Father Damien, who died the other day, is said to have contracted the disease while engaged in his mission work among the lepers at Honolulu. The contagious nature of the disease has, in more than one example, been made manifest, as if by experiment, through vaccinating (against small-pox) with lymph derived from persons who subsequently exhibited symptoms of leprosy.

A variety of animals, such as rabbits, guinea-pigs, cats, etc., have been experimented upon, in order to ascertain whether, or under what conditions, leprosy, or at least something like it, can be communicated to them. It seems as if in certain animals and under certain conditions, leprosy-bacilli can be brought to multiply, thereby causing changes similar to what takes place in leprosy as it occurs naturally in human beings.

I can offer the following experiment. On the 6th June, 1887, a number of sterilised silk-threads were soaked with fresh leprosy-blood, of the same origin as that from which samples for cultivation were derived (see above), and placed in sterile, cotton-wool stoppered test-tubes. Those which were steeped in the blood exceedingly rich in bacilli, were used, soon after my return to Sydney, for inoculating a guinea-pig and three house-mice. The guinea-pig, a full-grown specimen, received some of the silk-threads in a small subcutaneous pouch made at the inner side of the left thigh. At the point of inoculation there was noticed, after some time, a small hardened mass, which, however, disappeared again gradually. The animal was not any further operated upon. It is alive up to the present (that is, after two years), and never showed any symptoms of disease.

The three mice received one silk-thread each subcutaneously at the root of the tail. They died within about a month, without exhibiting, at the post mortem examination, anything that looked suspicious. Leprosy-bacilli were not found.

2.—On "Air-gas" for Bacteriological Work

When, a year ago, the Intercolonial Commission, appointed to inquire into, and report on schemes for the extermination of rabbits in Australasia, decided to erect a laboratory on a little island (Rodd Island) in a western portion of Port Jackson (called Iron Cove), in order to have certain infectious diseases tested, the question arose as to how this laboratory should be supplied with gas. Although the Island is only a few hundred yards from the mainland, where ordinary coal-gas was already in use, it was considered as too hazardous to conduct such gas across to the Island, on account of the formation of the bottom of the water at that place. The only way, therefore, to get out of the difficulty, was to manufacture the required gas on the Island itself. After

some deliberation, I decided to employ for this purpose a Müller's "Alpha Patent Gas-making Machine."

This apparatus produces gas in the shape of a mixture of atmospheric air and the vapour of gasolene or petroleum spirit (composed of carbon and hydrogen); this mixture is called "air-gas." By means of weights, atmospheric air is pumped through a drum into a chamber, where it becomes impregnated or "carburetted" with the vapour of that very volatile liquid. It is thus turned into gas; as such it passes into a small gasometer ("governor"), "whence it supplies automatically what is required for the burners, no matter how many are in use."

The machine used by me was a so-called 40-light one, in other words, one able to yield 200 cubic feet of gas per hour. A substantial little house, adjoining the laboratory, was specially built for it; this house also contained the store gasolene. Pipes were conducted all through the laboratory; the gas was employed both for heating and lighting.

My experience with this gas—I know it now for nearly a year—goes to show that it is, on the whole, well adapted for laboratory researches in cases where coal-gas cannot be easily obtained. The whole apparatus requires only little room; the processes of filling in fresh gasolene, or of winding up the weights, take but little time. The knowledge of the way in which the machine works, and how it will give satisfactory results, must, of course, be acquired.*

It speaks well, I think, for the gas manufactured in the above-stated manner, that by aid of some thermo-regulator, and a little

* For a proper evaporation of the gasolene, it is necessary that the gas-making machine should be kept at not too low a temperature. In a climate such as that of Sydney, the prevailing temperatures all through the year are favourable to the manufacture of "air-gas." In colder places, in winter it will become necessary to arrange for special heaters in the gas house.

extra attention, it can without risk be used for heating thermostats. For instance, I wanted a temperature in the thermostat of 38°C.; by means of an Argand burner supplied with such gas, and of a Reichert-Babes thermo-regulator, this temperature was kept up, within a few tenths of a degree, for weeks.

Bunsen's burners can only discriminately be used when working with this gas, which is mostly too rich in carbon for these burners to give a non-luminous or almost non-luminous flame. When the gas gets poorer, that is, when it contains more atmospheric air, Bunsen's burners can with advantage be taken for the purpose of heating. Fletcher's burners, which have a large opening stretched over with strong wire-gauze or perforated metal, answer best for the gas, when intended for heating, say, steam-sterilisers or copper-boxes. For sterilising instruments, platinum-wires, glass-tubes, etc., I generally used a Fletcher's burner of long cylindrical shape with a flattening-out at the top, which was covered with wire-gauze.

I should add that the light of this gas from an Argand burner is admirably fitted for working with the microscope.